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Volume II

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## STRESS HISTORY SIMULATION

### Volume II

## A USER'S MANUAL FOR A COMPUTER PROGRAM TO MODIFY STRESS HISTORY SIMULATIONS

*MCDONNELL DOUGLAS CORPORATION*

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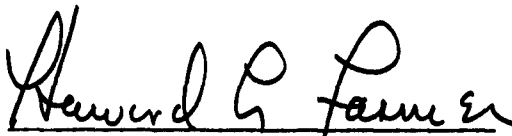


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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report presents a description of a computer program to combine and modify stress history simulations generated by a companion computer program described in Volume I. Input random stress history data sets are combined and modified to create stress spectra variations. Each variation is characterized by its mission mix; a mission mix consists of a particular order of mission types (Air-to-Air, Air-to-Ground, and Instrumentation and Navigation). An example problem is included which demonstrates the program output; a		

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sequential list of peaks and valleys of the flight by flight spectrum, and a summary table of the coupling of the peaks and valleys. Both of the computer programs were used in a study of load sequence effects on crack growth, summarized in AFFDL-TR-76-112, "Effects of Fighter Attack Spectrum on Crack Growth".

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## FOREWORD

This report was prepared by McDonnell Aircraft Company (MCAIR) St. Louis, Missouri, for the Structural Integrity Branch, Structural Mechanics Division, Air Force Flight Dynamics Laboratory, Wright-Patterson Air Force Base, Ohio under Contract F33615-75-C-3112, Project 486U "Advanced Metallic Structures", Work Unit 486U0213, "Effect of Fighter Attack Spectrum on Crack Growth". The contract was administered by John M. Potter, Project Engineer, AFFDL/FBE.

The computer program that was developed during this study was accomplished by the Strength Department of McDonnell Aircraft Company (MCAIR). The study manager for MCAIR was J. F. Schier. Principal authors of this report are H. T. Young, F. R. Foster and H. D. Dill. L. F. Impellizzeri contributed to spectra development of the study.

This report covers work accomplished during the time period May 1975 through July 1976.

This report was released by the authors in August 1976 for publication.

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## 1. SUMMARY

The computer program described in this report was developed for use in a study of load sequence effects on crack growth, described in Reference 1. Cycle by cycle stress histories were generated using techniques based on random noise theory, these techniques were implemented in a computer program described in Volume I, Reference 2. Using that program, stress histories were generated for three baseline spectra: Air-to-Air, Air-to-Ground, and Instrumentation and Navigation. Using the program described in this report, a combination of these was created to form the fourth baseline spectrum, the Composite. The stress histories for these four baseline spectra were modified to create 102 spectra variations.

## 2. PROGRAM OUTLINE

This program combines and modifies stress history simulations, generated by a companion computer program, and creates four baseline spectra and 102 spectra variations. The baseline spectra are Air-to-Air (A-A), Air-to-Ground (A-G), Instrumentation and Navigation (I&N), and Composite. The spectra variation types are (a) Re-ordering of loads within a mission, (b) Sequence of missions, (c) Individual flight length, (d) Mission mix, (e) Individual flight length, (f) High and low load truncation, (g) Compression loads, (h) Exceedance curve variations, and (i) Coupling of peaks and valleys. Input to the program includes control numbers to create the spectra variations, and data sets of peak and valley stress history simulations obtained from the companion computer program, Volume I. Output includes a sequential list of peaks and valleys, and a table summarizing peak and valley coupling. Input and output are described in Sections 3 and 4, respectively.

The program consists of a main program and eight subroutines, as outlined in Figure 1. The function of each sub-program is described in the following paragraphs.

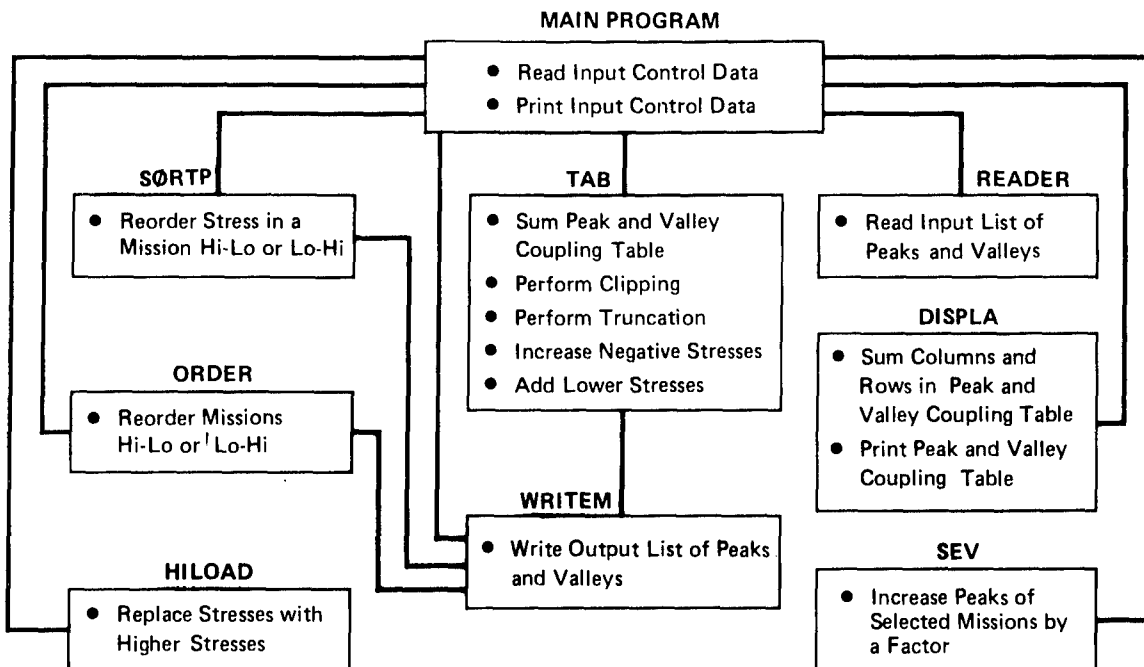


FIGURE 1. SUBPROGRAMS USED IN MODIFYING STRESS TIME HISTORIES



Main Program - The main program reads the input control data and prints the input data to permit a check. Subroutine READER is called to read the initial data sets of peak and valley stress history of each mission type (A-A, A-G, I&N) to be used in the spectrum. The main program is divided into three main process loops. Each loop develops the spectrum variation for a specific mission type either within the loop or by calling an appropriate subroutine.

The three main process loops are very similar. They develop the flight-by-flight spectrum from the input peak and valley stress history by replacing selected valleys with stresses representing ground loads. As more peak and valley stress history is needed, subroutine reader is called and an additional data array of the required mission type is read. A series of IF tests, controlled by input data, determines the variations to be performed. The only variation performed within the main process loops is associated with coupling of peaks and valleys. The remainder of the variations are performed by subroutines SORTP, ORDER, SEV, HILOAD and TAB. Messages at the end of the main program inform the user of input irregularities, such as a spectrum not ending with a stress representing ground load.

Subroutine READER - This subroutine reads input sets of peak and valley stress history. The peak and valley sequence of stresses is maintained by deletion of the first stress value of the new data set, if necessary. The mission type is controlled by the input variable IØ (1 = A-A, 2 = A-G, 3 = I&N).

Subroutine WRITEP - This subroutine is used to generate and write a sequential list of peaks and valleys. The array LIN contains a single line of data. IR is a count of number of values per line, with a maximum value of ten.

Subroutine TAB - This subroutine has a dual purpose. First, it develops a table summarizing coupling of peaks and valleys which becomes a portion of program output. Secondly, it performs variations common to all mission types (A-A, A-G, I&N) such as clipping, increasing the magnitude of negative maneuver stresses, truncations and addition of low stresses.

Subroutine DISPLA - This subroutine creates the column and line totals in the table summarizing coupling of peaks and valleys.

Subroutine SEV - This subroutine increases the severity of the peaks in selected missions.

Subroutine HILOAD - This subroutine replaces cycles with cycles containing the desired higher loads.

Subroutine SORTP - This subroutine reorders the loads within each mission either in a Hi-Lo or Lo-Hi sequence.

Subroutine ORDER - This subroutine reorders all missions into either a Hi-Lo or Lo-Hi sequence, based on the largest peak in each mission.

### 3. INPUT DATA REQUIREMENTS

Input to the program consists of control data to create the spectra variations, and three data sets containing peak and valley stress histories generated by companion computer program described in Volume I. These latter sets are identified as (1) A-A, (2) A-G, and (3) I&N.

The first input control data are LINE1 and GLØAD. These are used to describe the mission mix (combination of A-A, A-G, and I&N) and, for each mission type, the stress representing the ground load. The completion of the mission mix description is signaled by input of the value END for LINE1. After completion of the mission mix description, a series of forty-two indicators are read. Combinations of these indicators were used to create the 102 spectra variations studied in the work summarized in Reference 1.

The input data format is described in the computer program listing, via comment cards, Appendix A. Example input is presented in Appendix B; the data used to create the spectra studied in Reference 1 is listed in Appendix C.

#### 4. OUTPUT DESCRIPTION

The output consists of three sets. The first set is an echo of the input control data to permit a check.

The second set is a list of the cycle by cycle load spectrum; an option permits this spectrum to be written on a magnetic tape. The cycle by cycle load spectrum is listed both before and after reordering for spectrum variations with reordering of loads within a mission or with reordering of missions.

The third data is a table summarizing the coupling of peaks and valleys. The table has the valley (% Design Limit Stress) as the ordinate and peak (% Design Limit Stress) as the abscissa.

Example output is presented in Appendix B.

## 5. REFERENCES

1. Dill, H. D., and Saff, C. R., "Effect of Fighter Attack Spectrum on Crack Growth", AFFDL-TR-76-112, October 1976.
2. Dill, H. D., Young, H. T., "Stress History Simulation, Vol. I - A User's Manual for a Computer Program to Generate Stress History Simulations", AFFDL-TR-76-113, Vol. I, October 1976.

9

[illegible]

```
INTEGER LIST1(3), MIX(10,7), LINE1(7)
INTEGER END, WHERE
INTEGER MTYPE(3), HWMNY, EOFAG, EOFIN, FREQ
```

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234  
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000056      GLOAD,GLOADS(10)
000057      AADUM(2),AA(12000)
000058      AGDUM(2),AG(13000)
000059      IN(10000),LIN(10)
000060      IV8,IV9,IV11,IV12,IV13,IV14,IV15,IV16
000061      INLAS,INNMI,PEAK(100),VALLEY(100)
000062      INTEGER TABLE
000063      COMMON/HOUSE/ADDV(4),ADDP(4),LODVAL,GLOAD
000064      COMMON/LAW/ TABLE(30,30),TVV,TVP,LIN,LLC
000065      COMMON/INDIE/IND1,IND2,IND3,IND4,IND5,IND6,IND7,
000066      *IND8,IND9,IND10,IND11,IND12,IND13,IND14,IND15,
000067      *IND16,IV1,IV2,IV3,IV4,IV5,IV6,IV7,IV8,IV9,IV10,
000068      *IND11,IV12,IV13,IV14,IV15,IV16
000069      *IND11,IV12,IV13,IV14,IV15,IV16
000070      COMMON/VALLEY/VNM1
000071      DATA MIX/70*0/,IAA/0/,IAG/0/,IIN/0/
000072      DATA ISAA,ISAG,ISIN/3*0/,LLINC/0/
000073      DATA LIST1,IAA,ISIN,IN 1/
000074      DATA MTYPE,END/3*0/,END 1/
000075      DATA NPAA/0/,NPAG/0/,NPIN/0/,IR/1/,IPICK/=1/
000076      DATA EOFAA/0/,EOFAG/0/,EOFIN/0/,MISSION/1/,FAC/1.10/
000077      DATA AANNM1,AGNM1,INNMI,AALAS,AGLAS,INLAS/3*0.,3*1./
000078      DATA AADUM,AGDUM,INDUM/6*0.0/,ICT/0/
000079      I=0
000080      IZIP=1,30
000081      JZIP=1,30
000082      TABLE(IZIP,JZIP)=0.0
000083      TVV=52.5
000084      TVP=2.5
000085      READ(5,101,END=98) LINE1,GLOAD
000086      REFORMAT(4,18,516,2F6.1)
000087      IF(LINE1(1).EQ.END)GO TO 11
000088      DO 2 J=1,3
000089      IF(LINE1(1).EQ.LIST1(J))GO TO 3
000090      CONTINUE
000091      STOP 98
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157 0153      INPAA=INPAA+1
157 0154      IF (INPAA.GT.NPAA)CALL READER(INPAA,NPAA,AA,1,AALAS,AANM1,E0FAA
157 0156      *IF (NDAA)
157 0158      IF (E0FAA.GT.0)GO TO 60
157 0159      IR=IR+1
157 0161      IF (AA(INPAA).EQ.GLOAD)AA(INPAA)=GLOAD+.1
157 0163      C XXXX COUPLING OF PEAKS AND VALLEYS XXXXXXX
157 0165      IF (IND14.EQ.0) GO TO 75
157 0167      IF (IND14.NE.2) GO TO 30
157 0169      IF (ABS(AA(INPAA))=105.7).LT.:1)AA(INPAA)=114.2
157 0171      IF (ABS(AA(INPAA))=100.6).LT.:1)AA(INPAA)=111.2
157 0172      IF (ABS(AA(INPAA))=100.4).LT.:1)AA(INPAA)=109.2
157 0174      GO TO 75
157 0176      IF (IND14.NE.3) GO TO 31
157 0178      IF (ABS(AA(INPAA))=105.5).LT.:1)AA(INPAA)=114.2
157 0180      IF (ABS(AA(INPAA))=104.5).LT.:1)AA(INPAA)=111.2
157 0181      IF (ABS(AA(INPAA))=102.2).LT.:1)AA(INPAA)=109.2
157 0183      GO TO 75
157 0185      IF (IND14.NE.4) GO TO 75
157 0187      IF (ABS(AA(INPAA))=104.2).LT.:1)AA(INPAA)=114.2
157 0189      IF (ABS(AA(INPAA))=102.4).LT.:1)AA(INPAA)=111.2
157 0191      IF (ABS(AA(INPAA))=102.2).LT.:1)AA(INPAA)=109.2
157 0193      C CONTINUE
157 0194      LIN(IR)=AA(INPAA)
157 0195      IF (IAA/LL.NE.IAA)GO TO 177
157 0197      MISION=MISION+1
157 0198      LIN(IR)=GLOAD
157 0199      C XXXX REORDER LOADS WITHIN A MISSION XXX
157 0201      IF (IND1.EQ.0) GO TO 173
157 0203      CALL SORTP(PEAK,VALLEY,LLINC,GLOAD)
157 0205      C CONTINUE
157 0207      INCK=0
157 0209      IF (IPICK.NE.1)GO TO 278
157 0211      IF (IPICK.NE.1)GO TO 278
157 0213      LEINC=LLINC+1
157 0215      PEAK(LLINC)=AA(INPAA)
157 0217      VALLEY(LLINC)=AA(VALLEY(LLINC))=VNM1
157 0219      IF (INPAA.EQ.1)VALLEY(LLINC)=VNM1
157 0221      C XXXX INCREASE SEVERITY OF SELECTED FLIGHTS XXX
157 0223      IF (IND5.EQ.0) GO TO 179
157 0225      IF (MISION.GT.IV1.AND.MISION.LT.IV2)CALL SEV(AA(INPAA),LIN(IR),FAC)
157 0227      IF (IV3.EQ.0) GO TO 179
157 0229      IF (MISION.GT.IV3.AND.MISION.LT.IV4)CALL SEV(AA(INPAA),LIN(IR),FAC)
157 0231      C CONTINUE
157 0233      ADDITION OF HIGHER LOAD LEVELS XXX
157 0235      IF (IND13.EQ.0) GO TO 180
157 0237      IF (MISION/FREQ.EQ.MISION)CALL
157 0239      *HILOAD(AA(INPAA=1),AA(INPAA),LIN(IR=1),LIN(IR),MISION)
157 0241      C CONTINUE
157 0243      180

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187 0286      LIN(IR)=GLOAD
187 0287      C XXXX REORDER LOADS WITHIN A MISSION XXX
187 0288      IF(I(IND1.EQ.0)) GO TO 183
187 0289      CALL SORTP(PEAK,VALLEY,LLINC,GLOAD)
187 0290      CONTINUE
187 0291      C XXXX REORDER MISSIONS XXX
187 0292      IF(IND3.EQ.0) GO TO 184
187 0293      CALL ORDER(PEAK,VALLEY,LLINC,GLOAD)
187 0294      CONTINUE
187 0295      LLINC=0
187 0296      YPICK=IPICK*(=1)
187 0297      IF(IPICK.NE.1) GO TO 288
187 0298      LLINC=LLINC+1
187 0299      PEAK(LLINC)=AG(INPAG)
187 0300      VALLEY(LLINC)=AG(INPAG-1)
187 0301      IF(INPAG.EQ.1) VALLEY(LLINC)=VNM1
187 0302      C XXXX INCREASE SEVERITY OF SELECTED FLIGHTS XXX
187 0303      IF(IND6.EQ.0) GO TO 189
187 0304      IF(MISION.GT.IV5.AND.MISION.LT.IV6) CALL SEV(AG(INPAG),LIN(IR),FAC)
187 0305      CONTINUE
187 0306      C XXXX ADDITION OF HIGHER LOAD LEVELS XXX
187 0307      IF(IND13.EQ.0) GO TO 190
187 0308      IF(MISION/FREQ*FREQ.EQ.MISION) CALL
187 0309      *HLOAD(AG(INPAG=1),AG(INPAG),LIN(IR=1),MISION)
187 0310      CONTINUE
187 0311      CALL TAB
187 0312      * (AG(INPAG=1),AG(INPAG),NPAG,INPAG,AG(INPAG+1),IR,LIN(IR=1))
187 0313      IF(AG.NE.10.AND.IG.LT.HWMNY) CALL WRITE(MIR,LIN,8)
187 0314      LL=MIX(L,6)
187 0315      LLBIT=LL*MIX(L,7)
187 0316      IAG=0
187 0317      CONTINUE
187 0318      GO TO 60
187 0319      CUC
187 0320      IN LOOP BEGINS AT THIS POINT...
187 0321      90
187 0322      IF(EOFIN.GT.0) GO TO 60
187 0323      IF(I(IND1.GT.0) GO TO 94
187 0324      IF(MIX(L,2).EQ.1) GO TO 94
187 0325      IF(MTYPE(LL).GT.1) GO TO 94
187 0326      INPIN=INDIN
187 0327      ISTART=MIX(L,2)=1
187 0328      QNPIN=INPIN+1
187 0329      IF(I(IND1.GT.NPIN) CALL READER(INPIN,NPIN,IN,3,INLAS,INNM1,EOFIN)
187 0330      * I(EOFIN.GT.0) GO TO 60
187 0331      CONTINUE
187 0332      WHERE=MIX(L,3)
187 0333      LL=MIX(L,4)
187 0334      LLBIT=LL*MIX(L,5)
187 0335      91
187 0336      94
187 0337
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187 0344

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LEVEL 21.7 ( JAN 73 )

OS/360 FORTRAN H

COMPILER OPTIONS =

NAME= MAIN,OPT=02,LINECNT=55,SIZE=0008K,  
SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF  
C THIS SUBROUTINE REORDERS THE LOADS WITHIN EACH MISSION EITHER IN  
C A HILO OR LOHI SEQUENCE.

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1S77 0002
1S78 0003
1S79 0004
1S7A 0005
1S7B 0006

1S77 0007
1S78 0008
1S79 0009
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1S7C 0012
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IF(LIN(IR).EQ.GLOAD)GO TO 63
IF(LIN(IR=1).GT.LIN(IR))GO TO 61
IR=IR+1
IF(IR=1)GLOAD
LIN(IR)=GLOAD
WRITE(10)IR,LIN,10)
CALL JRN
END

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61  
63

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0060

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LEVEL 21.7 ( JAN 73 )                                OS/360  FORTRAN  H

      COMPILER OPTIONS = NAME=,MAIN,OPT=02,LLINECNT=55,SIZE=0000K,
      SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF

      THIS SUBROUTINE REORDERS ALL MISSIONS INTO EITHER A HILO OR LOHI
      SEQUENCE BASED ON THE LARGEST PEAK IN EACH MISSION.

      SUBROUTINE ORDER(P,V,LLINC,GLOAD)
      REAL LIN(10)
      COMMON/INDIE/IV9,IV11,IV12,IV13,IV14,IV15,IV16
      *IND8,IND9,IND10,IND11,IND12,IND13,IND14,IND15,
      *IND16,IND17,IND18,IND19,IND20,IND21,IND22,IND23,IND24,IND25,
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      *IND656,IND657,IND658,IND659,IND660,IND661,IND662,IND663,IND664,IND665,
      *IND666,IND667,IND668,IND669,IND670,IND671,IND672,IND673,IND674,IND675,
      *IND676,IND677,IND678,IND679,IND680,IND681,IND682,IND683,IND684,IND685,
      *IND686,IND687,IND688,IND689,IND690,IND691,IND692,IND693,IND694,IND695,
      *IND696,IND697,IND698,IND699,IND700,IND701,IND702,IND703,IND704,IND705,
      *IND706,IND707,IND708,IND709,IND710,IND711,IND712,IND713,IND714,IND715,
      *IND716,IND717,IND718,IND719,IND720,IND721,IND722,IND723,IND724,IND725,
      *IND726,IND727,IND728,IND729,IND730,IND731,IND732,IND733,IND734,IND735,
      *IND736,IND737,IND738,IND739,IND740,IND741,IND742,IND743,IND744,IND745,
      *IND746,IND747,IND748,IND749,IND750,IND751,IND752,IND753,IND754,IND755,
      *IND756,IND757,IND758,IND759,IND760,IND761,IND762,IND763,IND764,IND7
```









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LEVEL 21.7 ( JAN 73 )                                OS/360  FORTRAN H

      COMPILER OPTIONS - NAME= MAIN,OPT=02,LINECNT=55,SIZE=0000K,
                        SOURCE,EBCDIC,NOLIST,NODECK,LOAD,HAP,NOEDIT,ID,NOXREF
C0000000
      THIS ROUTINE IS USED TO GENERATE THE SPECTRUM LISTING.
      LIN=CONTAINS A SINGLE LINE OF DATA
      IR=A COUNT OF THE NUMBER OF VALUES PER LINE,NOT > 10.
      IO=NUMBER OF THE OUTPUT DATA SET.(8,9,10).

      SUBROUTINE WRITEM(IR,LIN,IO)
      REAL LIN(10)
      WRITE(10,1)(LIN(I),I=1,IR)
      1  FORMAT(10F7.1)
      IR=0
      IRETURN
      END

```

```

1S77 0002
1S77 0003
1S77 0004
1S77 0005
1S77 0006
1S77 0007
1S77 0008

```



```

LEVEL 21.7 ( JAN 73 )
                                OS/360  FORTRAN H

COMPILER OPTIONS = NAME= MAIN,OPT=02,LINECNT=55,SIZE=0000K,
SOURCE,ERCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF

C THIS ROUTINE READS A SEED OF DATA ACCORDING TO (IO) 1=AA,2=AG,3=IN,
C THE VALLEY=PEAK SEQUENCE IS NOT DISRUPTED FROM SEED TO SEED.

SUBROUTINE READER(I,NP,A,IO,LAS,NM1,EOF,IND)
REAL LAS,NM1
INTEGER EOF
DIMENSION A(1)
COMMON/VALLEY/VNM1
READ(IO,END=1)(NP,(A(L/2),L=2,NP,2))
V.LT. P .AND. V.LT. P
IF(NM1.LT.LAS.AND.A(1).LT.A(2))GO TO 2
P.GT. V .AND. P.GT. V
IF(NM1.GT.LAS.AND.A(1).GT.A(2))GO TO 2
I=2
IND=1
NP=NPM/2
VNM1=LAS
LAS=A(NP)
NM1=A(NP=1)
WRITE(9,201) NP,IO IO=1,13)
201 FORMAT(1 NP=1,19,1
RETURN
1 RETURN
2 IND=0
GO TO 3
END

```

LEVEL 21.7 ( JAN 73 )

OS/360 FORTRAN H

COMPILER OPTIONS = NAME= MAIN,OPT=02,LINECNT=55,SIZE=0000K,  
SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF  
C THIS SUBROUTINE PERFORMS COLUMN AND LINE TOTALS ON THE  
C OCCURENCE TABLE.

```

0002      SUBROUTINE DISPLA(MISION)
0003      INTEGER X(30),Y(30)
0004      INTEGER I
0005      COMMON/LAW/ T(30,30),DUM1,DUM2,DUM3(10),LLL
0006      DATA X/-50,-45,-40,-35,-30,-25,-20,-15,-10,-5,0,5,10,15,
0007      *20,25,30,35,40,45,50,55,60,65,70,75,80,85,90,
0008      *95,100,105,110,115,120,125,130,135,140,145,150,155,160,165,170,175,180,185,190,195,200,205,210,215,220,225,230,235,240,245,250,255,260,265,270,275,280,285,290,295,300,305,310,315,320,325,330,335,340,345,350,355,360,365,370,375,380,385,390,395,400,405,410,415,420,425,430,435,440,445,450,455,460,465,470,475,480,485,490,495,500,505,510,515,520,525,530,535,540,545,550,555,560,565,570,575,580,585,590,595,600,605,610,615,620,625,630,635,640,645,650,655,660,665,670,675,680,685,690,695,700,705,710,715,720,725,730,735,740,745,750,755,760,765,770,775,780,785,790,795,800,805,810,815,820,825,830,835,840,845,850,855,860,865,870,875,880,885,890,895,900,905,910,915,920,925,930,935,940,945,950,955,960,965,970,975,980,985,990,995,1000,1005,1010,1015,1020,1025,1030,1035,1040,1045,1050,1055,1060,1065,1070,1075,1080,1085,1090,1095,1100,1105,1110,1115,1120,1125,1130,1135,1140,1145,1150,1155,1160,1165,1170,1175,1180,1185,1190,1195,1200,1205,1210,1215,1220,1225,1230,1235,1240,1245,1250,1255,1260,1265,1270,1275,1280,1285,1290,1295,1300,1305,1310,1315,1320,1325,1330,1335,1340,1345,1350,1355,1360,1365,1370,1375,1380,1385,1390,1395,1400,1405,1410,1415,1420,1425,1430,1435,1440,1445,1450,1455,1460,1465,1470,1475,1480,1485,1490,1495,1500,1505,1510,1515,1520,1525,1530,1535,1540,1545,1550,1555,1560,1565,1570,1575,1580,1585,1590,1595,1600,1605,1610,1615,1620,1625,1630,1635,1640,1645,1650,1655,1660,1665,1670,1675,1680,1685,1690,1695,1700,1705,1710,1715,1720,1725,1730,1735,1740,1745,1750,1755,1760,1765,1770,1775,1780,1785,1790,1795,1800,1805,1810,1815,1820,1825,1830,1835,1840,1845,1850,1855,1860,1865,1870,1875,1880,1885,1890,1895,1900,1905,1910,1915,1920,1925,1930,1935,1940,1945,1950,1955,1960,1965,1970,1975,1980,1985,1990,1995,2000,2005,2010,2015,2020,2025,2030,2035,2040,2045,2050,2055,2060,2065,2070,2075,2080,2085,2090,2095,2100,2105,2110,2115,2120,2125,2130,2135,2140,2145,2150,2155,2160,2165,2170,2175,2180,2185,2190,2195,2200,2205,2210,2215,2220,2225,2230,2235,2240,2245,2250,2255,2260,2265,2270,2275,2280,2285,2290,2295,2300,2305,2310,2315,2320,2325,2330,2335,2340,2345,2350,2355,2360,2365,2370,2375,2380,2385,2390,2395,2400,2405,2410,2415,2420,2425,2430,2435,2440,2445,2450,2455,2460,2465,2470,2475,2480,2485,2490,2495,2500,2505,2510,2515,2520,2525,2530,2535,2540,2545,2550,2555,2560,2565,2570,2575,2580,2585,2590,2595,2600,2605,2610,2615,2620,2625,2630,2635,2640,2645,2650,2655,2660,2665,2670,2675,2680,2685,2690,2695,2700,2705,2710,2715,2720,2725,2730,2735,2740,2745,2750,2755,2760,2765,2770,2775,2780,2785,2790,2795,2800,2805,2810,2815,2820,2825,2830,2835,2840,2845,2850,2855,2860,2865,2870,2875,2880,2885,2890,2895,2900,2905,2910,2915,2920,2925,2930,2935,2940,2945,2950,2955,2960,2965,2970,2975,2980,2985,2990,2995,3000,3005,3010,3015,3020,3025,3030,3035,3040,3045,3050,3055,3060,3065,3070,3075,3080,3085,3090,3095,3100,3105,3110,3115,3120,3125,3130,3135,3140,3145,3150,3155,3160,3165,3170,3175,3180,3185,3190,3195,3200,3205,3210,3215,3220,3225,3230,3235,3240,3245,3250,3255,3260,3265,3270,3275,3280,3285,3290,3295,3300,3305,3310,3315,3320,3325,3330,3335,3340,3345,3350,3355,3360,3365,3370,3375,3380,3385,3390,3395,3400,3405,3410,3415,3420,3425,3430,3435,3440,3445,3450,3455,3460,3465,3470,3475,3480,3485,3490,3495,3500,3505,3510,3515,3520,3525,3530,3535,3540,3545,3550,3555,3560,3565,3570,3575,3580,3585,3590,3595,3600,3605,3610,3615,3620,3625,3630,3635,3640,3645,3650,3655,3660,3665,3670,3675,3680,3685,3690,3695,3700,3705,3710,3715,3720,3725,3730,3735,3740,3745,3750,3755,3760,3765,3770,3775,3780,3785,3790,3795,3800,3805,3810,3815,3820,3825,3830,3835,3840,3845,3850,3855,3860,3865,3870,3875,3880,3885,3890,3895,3900,3905,3910,3915,3920,3925,3930,3935,3940,3945,3950,3955,3960,3965,3970,3975,3980,3985,3990,3995,4000,4005,4010,4015,4020,4025,4030,4035,4040,4045,4050,4055,4060,4065,4070,4075,4080,4085,4090,4095,4100,4105,4110,4115,4120,4125,4130,4135,4140,4145,4150,4155,4160,4165,4170,4175,4180,4185,4190,4195,4200,4205,4210,4215,4220,4225,4230,4235,4240,4245,4250,4255,4260,4265,4270,4275,4280,4285,4290,4295,4300,4305,4310,4315,4320,4325,4330,4335,4340,4345,4350,4355,4360,4365,4370,4375,4380,4385,4390,4395,4400,4405,4410,4415,4420,4425,4430,4435,4440,4445,4450,4455,4460,4465,4470,4475,4480,4485,4490,4495,4500,4505,4510,4515,4520,4525,4530,4535,4540,4545,4550,4555,4560,4565,4570,4575,4580,4585,4590,4595,4600,4605,4610,4615,4620,4625,4630,4635,4640,4645,4650,4655,4660,4665,4670,4675,4680,4685,4690,4695,4700,4705,4710,4715,4720,4725,4730,4735,4740,4745,4750,4755,4760,4765,4770,4775,4780,4785,4790,4795,4800,4805,4810,4815,4820,4825,4830,4835,4840,4845,4850,4855,4860,4865,4870,4875,4880,4885,4890,4895,4900,4905,4910,4915,4920,4925,4930,4935,4940,4945,4950,4955,4960,4965,4970,4975,4980,4985,4990,4995,5000,5005,5010,5015,5020,5025,5030,5035,5040,5045,5050,5055,5060,5065,5070,5075,5080,5085,5090,5095,5100,5105,5110,5115,5120,5125,5130,5135,5140,5145,5150,5155,5160,5165,5170,5175,5180,5185,5190,5195,5200,5205,5210,5215,5220,5225,5230,5235,5240,5245,5250,5255,5260,5265,5270,5275,5280,5285,5290,5295,5300,5305,5310,5315,5320,5325,5330,5335,5340,5345,5350,5355,5360,5365,5370,5375,5380,5385,5390,5395,5400,5405,5410,5415,5420,5425,5430,5435,5440,5445,5450,5455,5460,5465,5470,5475,5480,5485,5490,5495,5500,5505,5510,5515,5520,5525,5530,5535,5540,5545,5550,5555,5560,5565,5570,5575,5580,5585,5590,5595,5600,5605,5610,5615,5620,5625,5630,5635,5640,5645,5650,5655,5660,5665,5670,5675,5680,5685,5690,5695,5700,5705,5710,5715,5720,5725,5730,5735,5740,5745,5750,5755,5760,5765,5770,5775,5780,5785,5790,5795,5800,5805,5810,5815,5820,5825,5830,5835,5840,5845,5850,5855,5860,5865,5870,5875,5880,5885,5890,5895,5900,5905,5910,5915,5920,5925,5930,5935,5940,5945,5950,5955,5960,5965,5970,5975,5980,5985,5990,5995,6000,6005,6010,6015,6020,6025,6030,6035,6040,6045,6050,6055,6060,6065,6070,6075,6080,6085,6090,6095,6100,6105,6110,6115,6120,6125,6130,6135,6140,6145,6150,6155,6160,6165,6170,6175,6180,6185,6190,6195,6200,6205,6210,6215,6220,6225,6230,6235,6240,6245,6250,6255,6260,6265,6270,6275,6280,6285,6290,6295,6300,6305,6310,6315,6320,6325,6330,6335,6340,6345,6350,6355,6360,6365,6370,6375,6380,6385,6390,6395,6400,6405,6410,6415,6420,6425,6430,6435,6440,6445,6450,6455,6460,6465,6470,6475,6480,6485,6490,6495,6500,6505,6510,6515,6520,6525,6530,6535,6540,6545,6550,6555,6560,6565,6570,6575,6580,6585,6590,6595,6600,6605,6610,6615,6620,6625,6630,6635,6640,6645,6650,6655,6660,6665,6670,6675,6680,6685,6690,6695,6700,6705,6710,6715,6720,6725,6730,6735,6740,6745,6750,6755,6760,6765,6770,6775,6780,6785,6790,6795,6800,6805,6810,6815,6820,6825,6830,6835,6840,6845,6850,6855,6860,6865,6870,6875,6880,6885,6890,6895,6900,6905,6910,6915,6920,6925,6930,6935,6940,6945,6950,6955,6960,6965,6970,6975,6980,6985,6990,6995,7000,7005,7010,7015,7020,7025,7030,7035,7040,7045,7050,7055,7060,7065,7070,7075,7080,7085,7090,7095,7100,7105,7110,7115,7120,7125,7130,7135,7140,7145,7150,7155,7160,7165,7170,7175,7180,7185,7190,7195,7200,7205,7210,7215,7220,7225,7230,7235,7240,7245,7250,7255,7260,7265,7270,7275,7280,7285,7290,7295,7300,7305,7310,7315,7320,7325,7330,7335,7340,7345,7350,7355,7360,7365,7370,7375,7380,7385,7390,7395,7400,7405,7410,7415,7420,7425,7430,7435,7440,7445,7450,7455,7460,7465,7470,7475,7480,7485,7490,7495,7500,7505,7510,7515,7520,7525,7530,7535,7540,7545,7550,7555,7560,7565,7570,7575,7580,7585,7590,7595,7600,7605,7610,7615,7620,7625,7630,7635,7640,7645,7650,7655,7660,7665,7670,7675,7680,7685,7690,7695,7700,7705,7710,7715,7720,7725,7730,7735,7740,7745,7750,7755,7760,7765,7770,7775,7780,7785,7790,7795,7800,7805,7810,7815,7820,7825,7830,7835,7840,7845,7850,7855,7860,7865,7870,7875,7880,7885,7890,7895,7900,7905,7910,7915,7920,7925,7930,7935,7940,7945,7950,7955,7960,7965,7970,7975,7980,7985,7990,7995,8000,8005,8010,8015,8020,8025,8030,8035,8040,8045,8050,8055,8060,8065,8070,8075,8080,8085,8090,8095,8100,8105,8110,8115,8120,8125,8130,8135,8140,8145,8150,8155,8160,8165,8170,8175,8180,8185,8190,8195,8200,8205,8210,8215,8220,8225,8230,8235,8240,8245,8250,8255,8260,8265,8270,8275,8280,8285,8290,8295,8300,8305,8310,8315,8320,8325,8330,8335,8340,8345,8350,8355,8360,8365,8370,8375,8380,8385,8390,8395,8400,8405,8410,8415,8420,8425,8430,8435,8440,8445,8450,8455,8460,8465,8470,8475,8480,8485,8490,8495,8500,8505,8510,8515,8520,8525,8530,8535,8540,8545,8550,8555,8560,8565,8570,8575,8580,8585,8590,8595,8600,8605,8610,8615,8620,8625,8630,8635,8640,8645,8650,8655,8660,8665,8670,8675,8680,8685,8690,8695,8700,8705,8710,8715,8720,8725,8730,8735,8740,8745,8750,8755,8760,8765,8770,8775,8780,8785,8790,8795,8800,8805,8810,8815,8820,8825,8830,8835,8840,8845,8850,8855,8860,8865,8870,8875,8880,8885,8890,8895,8900,8905,8910,8915,8920,8925,8930,8935,8940,8945,8950,8955,8960,8965,8970,8975,8980,8985,8990,8995,9000,9005,9010,9015,9020,9025,9030,9035,9040,9045,9050,9055,9060,9065,9070,9075,9080,9085,9090,9095,9100,9105,9110,9115,9120,9125,9130,9135,9140,9145,9150,9155,9160,9165,9170,9175,9180,9185,9190,9195,9200,9205,9210,9215,9220,9225,9230,9235,9240,9245,9250,9255,9260,9265,9270,9275,9280,9285,9290,9295,9300,9305,9310,9315,9320,9325,9330,9335,9340,9345,9350,9355,9360,9365,9370,9375,9380,9385,9390,9395,9400,9405,9410,9415,9420,9425,9430,9435,9440,9445,9450,9455,9460,9465,9470,9475,9480,9485,9490,9495,9500,9505,9510,9515,9520,9525,9530,9535,9540,9545,9550,9555,9560,9565,9570,9575,9580,9585,9590,9595,9600,9605,9610,9615,9620,9625,9630,9635,9640,9645,9650,9655,9660,9665,9670,9675,9680,9685,9690,9695,9700,9705,9710,9715,9720,9725,9730,9735,9740,9745,9750,9755,9760,9765,9770,9775,9780,9785,9790,9795,9800,9805,9810,9815,9820,9825,9830,9835,9840,9845,9850,9855,9860,9865,9870,9875,9880,9885,9890,9895,9900,9905,9910,9915,9920,9925,9930,9935,9940,9945,9950,9955,9960,9965,9970,9975,9980,9985,9990,9995,10000,10005,10010,10015,10020,10025,10030,10035,10040,10045,10050,10055,10060,10065,10070,10075,10080,10085,10090,10095,10100,10105,10110,10115,10120,10125,10130,10135,10140,10145,10150,10155,10160,10165,10170,10175,10180,10185,10190,10195,10200,10205,10210,10215,10220,10225,10230,10235,10240,10245,10250,10255,10260,10265,10270,10275,10280,10285,10290,10295,10300,10305,10310,10315,10320,10325,10330,10335,10340,10345,10350,10355,10360,10365,10370,10375,10380,10385,10390,10395,10400,10405,10410,10415,10420,10425,10430,10435,10440,10445,10450,10455,10460,10465,10470,10475,10480,10485,10490,10495,10500,10505,10510,10515,10520,10525,10530,10535,10540,10545,10550,10555,10560,10565,10570,10575,10580,10585,10590,10595,10600,10605,10610,10615,10620,10625,10630,10635,10640,10645,10650,10655,10660,10665,10670,10675,10680,10685,10690,10695,10700,10705,10710,10715,10720,10725,10730,10735,10740,10745,10750,10755,10760,10765,10770,10775,10780,10785,10790,10795,10800,10805,10810,10815,10820,10825,10830,10835,10840,10845,10850,10855,10860,10865,10870,10875,10880,10885,10890,10895,10900,10905,10910,10915,10920,10925,10930,10935,10940,10945,10950,10955,10960,10965,10970,10975,10980,10985,10990,10995,11000,11005,11010,11015,11020,11025,11030,11035,11040,11045,11050,11055,11060,11065,11070,11075,11080,11085,11090,11095,11100,11105,11110,11115,11120,11125,11130,11135,11140,11145,11150,11155,11160,11165,11170,11175,11180,11185,11190,11195,11200,11205,11210,11215,11220,11225,11230,11235,11240,11245,11250,11255,11260,11265,11270,11275,11280,11285,11290,11295,11300,11305,11310,11315,11320,11325,11330,11335,11340,11345,11350,11355,11360,11365,11370,11375,11380,11385,11390,11395,11400,11405,11410,11415,11420,11425,11430,11435,11440,11445,11450,11455,11460,11465,11470,11475,11480,11485,11490,11495,11500,11505,11510,11515,11520,11525,11530,11535,11540,11545,11550,11555,11560,11565,11570,11575,11580,11585,11590,11595,11600,11605,11610,11615,11620,11625,11630,11635,11640,11645,11650,11655,11660,11665,11670,11675,11680,11685,11690,11695,11700,11705,11710,11715,11720,11725,11730,11735,11740,11745,11750,11755,11760,11765,11770,11775,11780,11785,11790,11795,11800,11805,11810,11815,11820,11825,11830,11835,11840,11845,11850,11855,11860,11865,11
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LEVEL 21.7 ( JAN 73 )
                                OS/360  FORTRAN H
      COMPILER OPTIONS = NAME= MAIN,OPT=02,LINECNT=55,SIZE=0000K,
      SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
      C THE PURPOSE OF THIS SUBROUTINE IS TO ADJUST SELECTED PEAKS
      C (AA,AG,IN) BY A GIVEN FACTOR(FAC).
      C
      SUBROUTINE SEV(PEAK,PEAKL,FAC)
      PEAK=PEAK*FAC
      PEAKL=PEAKL*FAC
      RETURN
      END
0002
0003
0004
0005
0006
1527
1527
1527
1527
1527

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APPENDIX B  
SAMPLE PROBLEM WITH INPUT DATA LISTING

INPUT DATA

AA	1	9464	52	182	0	0	=5:		
A3	1	6764	38	178	0	0	=10:		
IV	1	576	12	48	0	0	=5:		
AA	9465	18980	52	183	0	0	=5:		
A3	6765	13490	38	177	0	0	=10:		
IV	577	1152	12	48	0	0	=5:		
END									
816	0	0.	0.	0.	0.	0.	0.	0.	0.
	0	0							
	0	0	0	0	0	0	0	0	0.
	0	0	0	0	0	0	0	0	
	0	0.	0	0.	0	0	0.	0	
	0	0	0						

OUTPUT DATA

THE NUMBER OF GROUPS IS 6

AA	1	9464	52	182	0	0	=5.0
A3	1	6764	38	178	0	0	=10.0
IV	1	576	12	48	0	0	=5.0
AA	9465	18980	52	183	0	0	=5.0
A3	6765	13490	38	177	0	0	=10.0
IV	577	1152	12	48	0	0	=5.0

MISNUM= 816    LODVAL= 0

IND1= 0	IND2= 0			
IND3= 0	IND4= 0			
IND5= 0	IV1= 0	IV2= 0	IV3= 0	IV4= 0
IND6= 0	IV5= 0	IV6= 0		
IND7= 0	IND8= 0	IND9= 0	IV7= 0	IV8= 0.0
IND9= 0.0	IV10= 0	IV11= 0.0	IV12= 0.0	
IND10= 0.0	IV13= 0.0	IND11= 0	IV14= 0.0	IND12= 0
IND15= 0.0	IV16= 0.0	IND13= 0		
IND14= 0	IND15= 0	IND16= 0		

THE TOTAL NUMBER OF MISSIONS IS 816



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| 0 | 3 | 2 | 2 | 7 | 7 | 2 | 2 | 4 | 1 | 5 | 9 | 4 | 4 | 3 | 0 | 6 | 4 | 3 | 8 | 3 | 2 | 2 | 6 | 6 | 8 | 8 | 9 | 2 | 0 | 6 | 1 | 6 | 2 | 7 | 0 | 3 | 6 | 0 | 2 | 2 | 3 | 6 | 0 | 8 | 9 | 1 | 1 | 3 | 3 | 7 |   |   |   |   |
| 6 | 3 | 2 | 2 | 6 | 6 | 6 | 2 | 4 | 4 | 5 | 4 | 4 | 6 | 3 | 4 | 7 | 3 | 4 | 3 | 4 | 2 | 4 | 3 | 4 | 4 | 3 | 2 | 6 | 7 | 6 | 7 | 6 | 4 | 3 | 3 | 2 | 3 | 4 | 2 | 7 | 4 | 4 | 6 | 3 | 6 | 3 | 2 | 3 | 7 | 6 | 5 | 4 | 4 | 3 |

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1. இது ஒரு கட்டுப்பாட்டு அமைப்பு. 2. இது ஒரு கட்டுப்பாட்டு அமைப்பு. 3. இது ஒரு கட்டுப்பாட்டு அமைப்பு. 4. இது ஒரு கட்டுப்பாட்டு அமைப்பு. 5. இது ஒரு கட்டுப்பாட்டு அமைப்பு. 6. இது ஒரு கட்டுப்பாட்டு அமைப்பு. 7. இது ஒரு கட்டுப்பாட்டு அமைப்பு. 8. இது ஒரு கட்டுப்பாட்டு அமைப்பு. 9. இது ஒரு கட்டுப்பாட்டு அமைப்பு. 10. இது ஒரு கட்டுப்பாட்டு அமைப்பு.

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|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

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၂၀၁၇-၁၈ ခုနှစ်တွင် အစိုးရက အသုံးပြုသည့် နေရာများကို အသုံးပြုရန် အခွင့်အလမ်းများ ပေးအပ်ခဲ့သည်။  
 အသုံးပြုရန် အခွင့်အလမ်းများ ပေးအပ်ခဲ့သည်။

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၇၀ ဆကမ္ဘာပေါ်တွင် အများဆုံးနေထိုင်သော ၁၀ နိုင်ငံများကို ဖော်ပြထားသည်။  
 ၇၁ နိုင်ငံများ၏ အများဆုံးနေထိုင်သော နယ်မြေများကို ဖော်ပြထားသည်။

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၇. ဆေးကုသမှုဆောင်ရွက်မှုနှင့် ပတ်သက်သည့် ဆေးကုသမှုဆောင်ရွက်မှုဆိုင်ရာ အချက်အလက်များ  
 ၇.၁. ဆေးကုသမှုဆောင်ရွက်မှုဆိုင်ရာ အချက်အလက်များ  
 ၇.၂. ဆေးကုသမှုဆောင်ရွက်မှုဆိုင်ရာ အချက်အလက်များ

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-11401622831106021150100172802030230511102013226170414041000113903012687078

2027 69 87 97 13 0 40 50 87 82 17 6 20 4 3 8 8 4 4 2 3 0 9 2 0 5 7 4 8 7 5 0 8 4 27 6 6 0 0 0 0 6 8 7 1 2 3 3 6  
20 16 15 2 4 7 13 14 18 11 13 11 4 10 5 14 4 11 17 3 7 6 1 3 0 3 9 4 3 0 4 0 4 0 10 0 8 4 10 0 0 0 0 1 5 1 3 3 4





ተቀባይነትና የሥራ ጥራ ለማረጋገጥ የሚያስፈልጉትን ሁሉም ምክንያቶች ለማሟላት የሚችል መሆኑን ያሳያል።

በዚህ ሂደት ውስጥ የሚገኙትን ሁሉም ምክንያቶች ለማሟላት የሚችል መሆኑን ያሳያል።

በዚህ ሂደት ውስጥ የሚገኙትን ሁሉም ምክንያቶች ለማሟላት የሚችል መሆኑን ያሳያል።

በዚህ ሂደት ውስጥ የሚገኙትን ሁሉም ምክንያቶች ለማሟላት የሚችል መሆኑን ያሳያል።

በዚህ ሂደት ውስጥ የሚገኙትን ሁሉም ምክንያቶች ለማሟላት የሚችል መሆኑን ያሳያል።

በዚህ ሂደት ውስጥ የሚገኙትን ሁሉም ምክንያቶች ለማሟላት የሚችል መሆኑን ያሳያል።

በዚህ ሂደት ውስጥ የሚገኙትን ሁሉም ምክንያቶች ለማሟላት የሚችል መሆኑን ያሳያል።

በዚህ ሂደት ውስጥ የሚገኙትን ሁሉም ምክንያቶች ለማሟላት የሚችል መሆኑን ያሳያል።

በዚህ ሂደት ውስጥ የሚገኙትን ሁሉም ምክንያቶች ለማሟላት የሚችል መሆኑን ያሳያል።

በዚህ ሂደት ውስጥ የሚገኙትን ሁሉም ምክንያቶች ለማሟላት የሚችል መሆኑን ያሳያል።

[illegible][illegible]

၁၂၃၄၅၆၇၈၉၁၀၁၁၂၁၃၁၄၁၅၁၆၁၇၁၈၁၉၂၀၂၁၂၂၂၃၂၄၂၅၂၆၂၇၂၈၂၉၃၀၃၁၃၂၃၃၃၄၃၅၃၆၃၇၃၈၃၉၄၀  
 ၁၂၃၄၅၆၇၈၉၁၀၁၁၂၁၃၁၄၁၅၁၆၁၇၁၈၁၉၂၀၂၁၂၂၂၃၂၄၂၅၂၆၂၇၂၈၂၉၃၀၃၁၃၂၃၃၃၄၃၅၃၆၃၇၃၈၃၉၄၀

[illegible][illegible][illegible]

0 2 1 3 7 7 7 2 5 5 7 6 2 2 2 4 0 3 9 9 4 8 2 1 8 9 4 6 7 8 1 4 0 1 8 3 9 4 8 4 4 6 1 1 6 4 4 3 5 1 2 5 8 9 3 6 6 2 4 3 7 5 2 1 4 4 9 1 2





## APPENDIX C

## INPUT DATA FOR STUDY SPECTRA VARIATIONS

| TEST NAME                               | TEST TYPE | TEST DATE | TEST TIME | TEST DURATION | TEST STATUS | TEST RESULTS | TEST COMMENTS |
|---|-----------|-----------|-----------|---------------|-------------|--------------|---------------|
| COMPOSITE BASELINE                      | 1         | 9464      | 182       | 0             | 0           | -5.          |               |
| AA                                      | 1         | 6754      | 178       | 0             | 0           | -10.         |               |
| A3                                      | 1         | 576       | 48        | 0             | 0           | -5.          |               |
| IN                                      | 1         | 18980     | 183       | 0             | 0           | -10.         |               |
| AA                                      | 9465      | 13490     | 177       | 0             | 0           | -15.         |               |
| A3                                      | 6765      | 1152      | 48        | 0             | 0           | -5.          |               |
| IN                                      | 577       |           |           |               |             |              |               |
| END                                     |           |           |           |               |             |              |               |
| 516                                     | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| AIR-TO-AIR BASELINE                     | 1         | 4000      | 736       | 54            | 32          | -5.          |               |
| AA                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| A3                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| IN                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| AA                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| A3                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| IN                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| END                                     |           |           |           |               |             |              |               |
| 768                                     | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| AIR-TO-GROUND BASELINE                  | 1         | 4225      | 630       | 40            | 462         | -10.         |               |
| AA                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| A3                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| IN                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| AA                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| A3                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| IN                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| END                                     |           |           |           |               |             |              |               |
| 1092                                    | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| INSTRUMENTATION AND NAVIGATION BASELINE | 1         | 5340      | 12        | 10            | 210         | -5.          |               |
| AA                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| A3                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| IN                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| AA                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| A3                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| IN                                      | 0         | 0         | 0         | 0             | 0           | 0            | 0             |
| END                                     |           |           |           |               |             |              |               |
| 480                                     | 0         | 0         | 0         | 0             | 0           | 0            | 0             |

90

| SEQUENCE OF MISSIONS |    |    |     |    |    |     |    |    |     |
|----------------------|----|----|-----|----|----|-----|----|----|-----|
| 4                    | 32 | 54 | 736 | 32 | 54 | 736 | 32 | 54 | 736 |
| 44                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 43                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 42                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 41                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 40                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 39                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 38                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 37                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 36                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 35                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 34                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 33                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 32                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 31                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 30                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 29                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 28                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 27                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 26                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 25                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 24                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 23                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 22                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 21                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 20                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 19                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 18                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 17                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 16                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 15                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 14                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 13                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 12                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 11                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 10                   | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 9                    | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 8                    | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 7                    | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 6                    | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 5                    | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 4                    | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 3                    | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 2                    | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |
| 1                    | 0  | 0  | 0   | 0  | 0  | 0   | 0  | 0  | 0   |



[illegible]

RECORDING OF LOADS WITHIN A MISSION NO. 4 32  
1 40000 736 54 54 32  
AA

768  
768

5.

$$\begin{array}{c} \bullet \\ \circ \end{array} \quad \begin{array}{c} \bullet \\ \circ \end{array}$$
$$\begin{array}{c} \bullet \\ \circ \\ \\ \circ \quad \bullet \quad \circ \\ \circ \end{array}$$

RECORDING OF LOADS WITHIN A MISSION NO. 5  
A3 1 42420 38 630 40 462

1970-71

-10-

$$\begin{array}{c} \bullet \\ \bigcirc \end{array} \quad \begin{array}{c} \bullet \\ \bigcirc \end{array}$$
$$\begin{array}{c} \bullet \\ \circ \\ \\ \circ \quad \bullet \quad \circ \\ \circ \end{array}$$

RECORDING OF LOADS WITHIN A MISSION NO. 600  
AA 1 9464 52 182 0

14574377816  
441441E

1

00

$$\begin{array}{c} \bullet \\ \circ \\ \\ \circ \quad \bullet \quad \circ \\ \circ \end{array}$$











MISSION MIX NO. 24 AND 25  
 AA 1 9464 52  
 AA 1 6764 52  
 IV 1 576 12  
 AA 1 18980 12  
 AA 1 13490 12  
 IV 1 1152 12  
 EN 0  
 816 0 0 0 0 0 0  
 0 0 0 0 0 0 0  
 101 0 0 0 0 0 0

MISSION MIX NO. 26  
 AA 1 9464 52  
 AA 1 6764 52  
 IV 1 576 12  
 AA 1 18980 12  
 AA 1 13490 12  
 IV 1 1152 12  
 EN 0  
 816 0 0 0 0 0 0  
 0 0 0 0 0 0 0  
 491 0 0 0 0 0 0

MISSION MIX NO. 27 AND 28  
 AA 1 9464 52  
 AA 1 6764 52  
 IV 1 576 12  
 AA 1 18980 12  
 AA 1 13490 12  
 IV 1 1152 12  
 EN 0  
 816 0 0 0 0 0 0  
 0 0 0 0 0 0 0  
 183 0 0 0 0 0 0

000000 000000 000000 000000 000000 000000  
 182 178 148 183 177 148  
 5: 10: 5: 10: 5: 10:  
 0: 0: 0: 0: 0: 0:  
 0: 0: 0: 0: 0: 0:

000000 000000 000000 000000 000000 000000  
 182 178 148 183 177 148  
 5: 10: 5: 10: 5: 10:  
 0: 0: 0: 0: 0: 0:  
 0: 0: 0: 0: 0: 0:

000000 000000 000000 000000 000000 000000  
 182 178 148 183 177 148  
 5: 10: 5: 10: 5: 10:  
 0: 0: 0: 0: 0: 0:  
 0: 0: 0: 0: 0: 0:







|                      |    |     |    |    |     |
|----------------------|----|-----|----|----|-----|
| TRUNCATION VARIATION | 1  | 736 | 54 | 32 | -5. |
| AA                   | 0. | 0.  | 0. | 0. | 0.  |
| AD                   | 0. | 0.  | 0. | 0. | 0.  |
| 768                  | 0. | 0.  | 0. | 0. | 0.  |
| TRUNCATION VARIATION | 1  | 736 | 54 | 32 | -5. |
| AA                   | 0. | 0.  | 0. | 0. | 0.  |
| AD                   | 0. | 0.  | 0. | 0. | 0.  |
| 768                  | 0. | 0.  | 0. | 0. | 0.  |
| TRUNCATION VARIATION | 1  | 736 | 54 | 32 | -5. |
| AA                   | 0. | 0.  | 0. | 0. | 0.  |
| AD                   | 0. | 0.  | 0. | 0. | 0.  |
| 768                  | 0. | 0.  | 0. | 0. | 0.  |
| TRUNCATION VARIATION | 1  | 736 | 54 | 32 | -5. |
| AA                   | 0. | 0.  | 0. | 0. | 0.  |
| AD                   | 0. | 0.  | 0. | 0. | 0.  |
| 768                  | 0. | 0.  | 0. | 0. | 0.  |

|                      |    |     |    |    |     |
|----------------------|----|-----|----|----|-----|
| TRUNCATION VARIATION | 1  | 736 | 54 | 32 | -5. |
| AA                   | 0. | 0.  | 0. | 0. | 0.  |
| AD                   | 0. | 0.  | 0. | 0. | 0.  |
| 768                  | 0. | 0.  | 0. | 0. | 0.  |
| TRUNCATION VARIATION | 1  | 736 | 54 | 32 | -5. |
| AA                   | 0. | 0.  | 0. | 0. | 0.  |
| AD                   | 0. | 0.  | 0. | 0. | 0.  |
| 768                  | 0. | 0.  | 0. | 0. | 0.  |
| TRUNCATION VARIATION | 1  | 736 | 54 | 32 | -5. |
| AA                   | 0. | 0.  | 0. | 0. | 0.  |
| AD                   | 0. | 0.  | 0. | 0. | 0.  |
| 768                  | 0. | 0.  | 0. | 0. | 0.  |

|                      |    |     |    |    |     |
|----------------------|----|-----|----|----|-----|
| TRUNCATION VARIATION | 1  | 736 | 54 | 32 | -5. |
| AA                   | 0. | 0.  | 0. | 0. | 0.  |
| AD                   | 0. | 0.  | 0. | 0. | 0.  |
| 768                  | 0. | 0.  | 0. | 0. | 0.  |
| TRUNCATION VARIATION | 1  | 736 | 54 | 32 | -5. |
| AA                   | 0. | 0.  | 0. | 0. | 0.  |
| AD                   | 0. | 0.  | 0. | 0. | 0.  |
| 768                  | 0. | 0.  | 0. | 0. | 0.  |
| TRUNCATION VARIATION | 1  | 736 | 54 | 32 | -5. |
| AA                   | 0. | 0.  | 0. | 0. | 0.  |
| AD                   | 0. | 0.  | 0. | 0. | 0.  |
| 768                  | 0. | 0.  | 0. | 0. | 0.  |

|                      |    |     |    |    |     |
|----------------------|----|-----|----|----|-----|
| TRUNCATION VARIATION | 1  | 736 | 54 | 32 | -5. |
| AA                   | 0. | 0.  | 0. | 0. | 0.  |
| AD                   | 0. | 0.  | 0. | 0. | 0.  |
| 768                  | 0. | 0.  | 0. | 0. | 0.  |
| TRUNCATION VARIATION | 1  | 736 | 54 | 32 | -5. |
| AA                   | 0. | 0.  | 0. | 0. | 0.  |
| AD                   | 0. | 0.  | 0. | 0. | 0.  |
| 768                  | 0. | 0.  | 0. | 0. | 0.  |
| TRUNCATION VARIATION | 1  | 736 | 54 | 32 | -5. |
| AA                   | 0. | 0.  | 0. | 0. | 0.  |
| AD                   | 0. | 0.  | 0. | 0. | 0.  |
| 768                  | 0. | 0.  | 0. | 0. | 0.  |





|                             |      |       |      |      |      |      |    |    |      |
|-----------------------------|------|-------|------|------|------|------|----|----|------|
| TRUNCATION VARIATION NO. 13 |      |       |      |      |      |      |    |    |      |
| AA                          | 1    | 9464  | 32   | 182  | 12.5 | 101. | 0. | 0. | 0.   |
| AA                          | 1    | 6764  | 38   | 178  |      | 0    |    |    | -5:  |
| IN                          | 1    | 576   | 122  | 48   |      | 0    |    |    | -10: |
| AA                          | 9465 | 18980 | 52   | 183  |      | 0    |    |    | -5:  |
| AA                          | 6765 | 13490 | 38   | 177  |      | 0    |    |    | -10: |
| IN                          | 577  | 1152  | 12   | 48   |      | 0    |    |    | -5:  |
| IN                          |      |       |      |      |      |      |    |    |      |
| B16                         | 2    | 12.5  | 101. | 12.5 | 101. | 0.   | 0. | 0. | 0.   |
|                             | 0    | 0     | 0    | 0    | 0    | 0    | 0  | 0  | 0    |
|                             | 0    | 0     | 0    | 0    | 0    | 0    | 0  | 0  | 0    |
|                             | 0    | 0     | 0    | 0    | 0    | 0    | 0  | 0  | 0    |
|                             | 0    | 0     | 0    | 0    | 0    | 0    | 0  | 0  | 0    |

|                             |      |       |      |      |      |      |      |      |      |
|-----------------------------|------|-------|------|------|------|------|------|------|------|
| TRUNCATION VARIATION NO. 14 |      |       |      |      |      |      |      |      |      |
| AA                          | 1    | 9464  | 32   | 182  | 12.5 | 101. | 101. | 12.5 | 101. |
| AA                          | 1    | 6764  | 38   | 178  |      | 0    | 0    | 0    | 0    |
| IN                          | 1    | 576   | 122  | 48   |      | 0    | 0    | 0    | 0    |
| AA                          | 9465 | 18980 | 52   | 183  |      | 0    | 0    | 0    | 0    |
| AA                          | 6765 | 13490 | 38   | 177  |      | 0    | 0    | 0    | 0    |
| IN                          | 577  | 1152  | 12   | 48   |      | 0    | 0    | 0    | 0    |
| IN                          |      |       |      |      |      |      |      |      |      |
| B16                         | 4    | 12.5  | 101. | 12.5 | 101. | 101. | 101. | 12.5 | 101. |
|                             | 0    | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
|                             | 0    | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
|                             | 0    | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
|                             | 0    | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    |

TRUNCATION VARIATION NO. 15 (USES TRUNCATION VARIATIONS 16 AND 17)

|                             |      |       |      |     |      |      |      |      |      |
|-----------------------------|------|-------|------|-----|------|------|------|------|------|
| TRUNCATION VARIATION NO. 16 |      |       |      |     |      |      |      |      |      |
| AA                          | 1    | 9464  | 32   | 182 | 12.5 | 101. | 101. | 12.5 | 101. |
| AA                          | 1    | 6764  | 38   | 178 |      | 0    | 0    | 0    | 0    |
| IN                          | 1    | 576   | 122  | 48  |      | 0    | 0    | 0    | 0    |
| AA                          | 9465 | 18980 | 52   | 183 |      | 0    | 0    | 0    | 0    |
| AA                          | 6765 | 13490 | 38   | 177 |      | 0    | 0    | 0    | 0    |
| IN                          | 577  | 1152  | 12   | 48  |      | 0    | 0    | 0    | 0    |
| IN                          |      |       |      |     |      |      |      |      |      |
| B16                         | 1    | 12.5  | 115. | 0.  | 0.   | 0.   | 0.   | 0.   | 0.   |
|                             | 0    | 0     | 0    | 0   | 0    | 0    | 0    | 0    | 0    |
|                             | 0    | 0     | 0    | 0   | 0    | 0    | 0    | 0    | 0    |
|                             | 0    | 0     | 0    | 0   | 0    | 0    | 0    | 0    | 0    |
|                             | 0    | 0     | 0    | 0   | 0    | 0    | 0    | 0    | 0    |

```

TRUNCATION VARIATION NO. 17
AA 1 9464 182
A3 1 6764 178
IV 1 576 148
AA 1 18980 183
A3 6765 13490 177
IV 577 1152 148
EVC
B16 12.5 125. 0. 0. 0.
      000000 000000
      0. 0. 0. 0. 0.
      0. 0. 0. 0. 0.

```

```

TRUNCATION VARIATION NO. 18
AA 1 9464 182
A3 1 6764 178
IV 1 576 148
AA 1 18980 183
A3 6765 13490 177
IV 577 1152 148
EVC
B16 12.5 135. 0. 0. 0.
      000000 000000
      0. 0. 0. 0. 0.
      0. 0. 0. 0. 0.

```

```

TRUNCATION VARIATION NO. 19
AA 1 9464 182
A3 1 6764 178
IV 1 576 148
AA 1 18980 183
A3 6765 13490 177
IV 577 1152 148
EVC
B16 12.5 115. 12.5 0. 0.
      000000 000000
      0. 0. 0. 0. 0.
      0. 0. 0. 0. 0.

```

```

TRUNCATION VARIATION NO. 20
AA 1 9464 182
A3 1 6764 178
IV 1 576 148
AA 1 18980 183
A3 6765 13490 177
IV 577 1152 148
EVC
B16 12.5 125. 12.5 0. 0.
      000000 000000
      0. 0. 0. 0. 0.
      0. 0. 0. 0. 0.

```







[illegible][illegible][illegible]

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|                                  |        |     |     |     |     |     |     |     |     |
|----------------------------------|--------|-----|-----|-----|-----|-----|-----|-----|-----|
| EXCEEDANCE CURVE VARIATION NO. 4 |        |     |     |     |     |     |     |     |     |
| AA                               | 136600 | 46  | 132 | 48  | 636 | -5. |     |     |     |
| END                              |        |     |     |     |     |     |     |     |     |
| 768                              | 0.     | 0.  | 0.  | 0.  | 0.  | 0.  | 0.  | 0.  | 0.  |
|                                  | 0.0    | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|                                  | 0.0    | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|                                  | 0.0    | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|                                  | 0.0    | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|                                  | 0.0    | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| EXCEEDANCE CURVE VARIATION NO. 5 |        |     |     |     |     |     |     |     |     |
| AA                               | 138000 | 48  | 200 | 50  | 568 | -5. |     |     |     |
| END                              |        |     |     |     |     |     |     |     |     |
| 768                              | 0.     | 0.  | 0.  | 0.  | 0.  | 0.  | 0.  | 0.  | 0.  |
|                                  | 0.0    | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|                                  | 0.0    | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|                                  | 0.0    | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|                                  | 0.0    | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|                                  | 0.0    | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| EXCEEDANCE CURVE VARIATION NO. 6 |        |     |     |     |     |     |     |     |     |
| AA                               | 133600 | 42  | 96  | 44  | 672 | -5. |     |     |     |
| END                              |        |     |     |     |     |     |     |     |     |
| 768                              | 0.     | 0.  | 0.  | 0.  | 0.  | 0.  | 0.  | 0.  | 0.  |
|                                  | 0.0    | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|                                  | 0.0    | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|                                  | 0.0    | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|                                  | 0.0    | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|                                  | 0.0    | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

|                                     |      |       |    |     |    |     |      |   |   |
|-------------------------------------|------|-------|----|-----|----|-----|------|---|---|
| COUPLING OF PEAKS AND VALLEYS NO. 1 |      |       |    |     |    |     |      |   |   |
| AA                                  | 1    | 42794 | 54 | 107 | 56 | 661 | -5.  |   |   |
| END                                 | 768  | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
| COUPLING OF PEAKS AND VALLEYS NO. 2 |      |       |    |     |    |     |      |   |   |
| AA                                  | 1    | 47182 | 42 | 433 | 44 | 659 | -10. |   |   |
| END                                 | 1092 | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
| COUPLING OF PEAKS AND VALLEYS NO. 3 |      |       |    |     |    |     |      |   |   |
| AA                                  | 1    | 40724 | 52 | 374 | 54 | 394 | -5.  |   |   |
| END                                 | 768  | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
| COUPLING OF PEAKS AND VALLEYS NO. 4 |      |       |    |     |    |     |      |   |   |
| AA                                  | 1    | 44040 | 40 | 912 | 42 | 180 | -10. |   |   |
| END                                 | 1092 | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |
|                                     |      | 0     | 0  | 0   | 0  | 0   | 0    | 0 | 0 |

|                                      |      |       |    |      |    |    |        |       |    |    |
|--------------------------------------|------|-------|----|------|----|----|--------|-------|----|----|
| COUPLING OF PEAKS AND VALLEYS NO. 58 |      |       |    |      |    |    |        |       |    |    |
| AA                                   | 1    | 43166 | 56 | 689  | 0. | 0. | 79     | -5.   | 0. | 0. |
| END                                  | 769  | 0.    | 0. | 0.   | 0. | 0. | 0.     | 0.    | 0. | 0. |
| AA                                   | 1    | 43166 | 56 | 689  | 0. | 0. | 79     | -5.   | 0. | 0. |
| END                                  | 769  | 0.    | 0. | 0.   | 0. | 0. | 0.     | 0.    | 0. | 0. |
| COUPLING OF PEAKS AND VALLEYS NO. 64 |      |       |    |      |    |    |        |       |    |    |
| AA                                   | 1    | 45964 | 42 | 1042 | 0. | 0. | 50     | -10.  | 0. | 0. |
| END                                  | 1092 | 0.    | 0. | 0.   | 0. | 0. | 0.     | 0.    | 0. | 0. |
| AA                                   | 1    | 45964 | 42 | 1042 | 0. | 0. | 50     | -10.  | 0. | 0. |
| END                                  | 1092 | 0.    | 0. | 0.   | 0. | 0. | 0.     | 0.    | 0. | 0. |
| COUPLING OF PEAKS AND VALLEYS NO. 7  |      |       |    |      |    |    |        |       |    |    |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -5.   | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -10.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -15.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -20.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -25.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -30.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -35.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -40.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -45.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -50.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -55.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -60.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -65.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -70.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -75.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -80.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -85.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -90.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -95.  | 0. | 0. |
| AA                                   | 1    | 9464  | 32 | 182  | 0. | 0. | 000000 | -100. | 0. | 0. |









## APPENDIX D

### LIST OF COMPUTER PROGRAM SYMBOLS AND DEFINITIONS

#### MAIN PROGRAM

|         |   |
|---------|---|
| I       | An integer counter for the number of items in the mission mix                                       |
| J       | A do loop control variable used throughout the main program   |
| L       | The main process loop control variable  |
| M       | A do loop used when the multiple mission types are tallied  |
| AA      | A real array used to store one input array of Air-to-Air raw data                                   |
| AG      | A real array used to store one input array of Air-to-Ground raw data                                |
| ID      | An integer mission mix counter  |
| II      | A do loop control used when printing the input data   |
| IN      | A real array used to store one input array of Instrument raw data                                   |
| IQ      | A do loop control used to select the raw data from each raw data input array                        |
| IR      | An integer line counter   |
| IS      | A do loop control used when an initial mission type does not start at the beginning of the raw data |
| IV      | A do loop control used to read the four added peaks and valleys                                     |
| JJ      | A do loop control used when printing the input data   |
| LL      | The number of load per mission  |
| END     | An end of file check  |
| FAC     | An escalation factor used to increase severity  |
| IAA     | An integer peak and valley counter for Air-to-Air type missions                                     |
| IAG     | An integer peak and valley counter for Air-to-Ground type missions                                  |
| ICT     | A counter used to talley the seven possible added high loads  |
| IIN     | An integer Instrument mission type peak and valley counter  |
| IV1-IV9 | (See input parameters)  |

# PROGRAM SYMBOLS (MAIN) (Continued)

|           |  |
|-----------|--|
| LIN       | The output line counter  |
| LLL       | The mission type indicator   |
| MIX       | The mission mix storage array  |
| SEV       | The severity subroutine  |
| TAB       | The occurrence table subroutine  |
| TVP       | An occurrence table constraint for peaks   |
| TVV       | An occurrence table constraint for valleys   |
| ADDP      | Used for adding additional high peaks  |
| ADDV      | Used for adding additional high valleys  |
| FREQ      | The interval used for adding additional high loads   |
| IND1-IND9 | (See input parameters)   |
| ISAA      | A peak and valley counter switch for Air-to-Air type missions  |
| ISAG      | A peak and valley counter switch for Air-to-Ground type missions   |
| ISIN      | A peak and valley counter switch for Instrument type missions  |
| IV10-IV16 | (See input parameters)   |
| IZIP      | An integer counter   |
| NPAA      | The number of points in an Air-to-Air input array  |
| NPAG      | The number of points in an Air-to-Ground input array   |
| NPIN      | The number of points in an Instrument input array  |
| ORDA      | A subroutine which orders or reorders missions by some preset convention   |
| PEAK      | The peaks used during a single mission   |
| VNM1      | V(N-1) the prior valley at the time of use   |
| AADUM     | A dummy variable used to insure the proper peak valley couple at the beginning of the first Air-to-Air input array |
| AALAS     | A dummy variable used to insure the proper peak valley couple at the end of each Air-to-Ground input array         |
| AANM1     | AA(N-1) the last value of the prior Air-to-Air input array   |

# PROGRAM SYMBOLS (MAIN) (Continued)

|             |   |
|-------------|---|
| AGDUM       | A dummy variable used to insure the proper peak valley couple at the beginning of the first Air-to-Ground input array                           |
| AGLAS       | A dummy variable used to insure the proper peak valley couple at the end of each Air-to-Ground input array                                      |
| AGNM1       | AG(N-1) the last value of the prior Air-to-Ground input array   |
| EOFAA       | The end of file check for Air-to-Air missions   |
| EOFAG       | The end of file check for Air-to-Ground missions  |
| EOFIN       | The end of file check for Instrument missions   |
| GLOAD       | The ground load   |
| HWMNY       | A range number used in computing various mixes  |
| INDAA       | An integer switch used in selecting Air-to-Air input array  |
| INDAG       | An integer switch used in selecting Air-to-Ground input array   |
| INDIN       | An integer switch used in selecting Instrument input array  |
| INDUM       | A dummy variable used to insure the proper peak and valley couple at the beginning of the first Instrument input array                          |
| IND10-IND16 | (See input parameters)  |
| INLAS       | A dummy variable used to insure the proper peak and valley couple at the end of each Instrument input array                                     |
| INNMI       | IN(N-1) the last value of the prior Instrument input array  |
| INPAA       | For Air-to-Air type missions<br>INPAA = (1) the next input array starts with a valley<br>INPAA = (2) the next input array starts with a peak    |
| INPAG       | For Air-to-Ground type missions<br>INPAG = (1) the next input array starts with a valley<br>INPAG = (2) the next input array starts with a peak |
| INPIN       | For Instrument type missions<br>INPIN = (1) the next input array starts with a valley<br>INPIN = (2) the next input array starts with a peak    |
| IPICK       | A binary switch used to select a peak or valley at any point in any mission   |
| LINE1       | An input carrier array  |
| LIST1       | This array is used to identify the input mission mix  |

# PROGRAM SYMBOLS (MAIN) (Concluded)

|        |   |
|--------|---|
| LLINC  | Counts the peaks and valleys in each mission  |
| MIXIT  | Counts the types of missions in any mix   |
| MTYPE  | Stores the mission types for use in the program   |
| ORDER  | A subroutine which reorders peaks and valleys within a mission  |
| SORTF  | An entry point into subroutine SORTP used when all missions have been entered and the sorting of missions is about to occur.  |
| SORTP  | The mission ordering subroutine, entered at the end of each mission where the peaks and valleys of the mission are recorded on a direct access device for later sorting |
| TABLE  | A subroutine which compiles the occurrence table and performs common mission variations   |
| WHERE  | The lower limit of each input array   |
| DISPLA | The subroutine with at the end of run prints the occurrence table   |
| GLOADS | The storage array for all ground loads  |
| HILOAD | The subroutine which adds selected high loads to missions   |
| IERROR | A switch used to indicate that the final seed or mission does not end in a ground load  |
| ISTART | An integer switch used when a desired mission does not start at the beginning of an input array   |
| LLIBIT | Product of the number of cycles per mission and the number of missions  |
| LODVAL | The number of added high loads  |
| MISION | The mission counter   |
| MISNUM | The number of missions  |
| READER | An input routine used to read and adjust each new input array   |
| VALLEY | A valley storage array used for reordering of peak valley pairs within a mission and for storing missions to be reordered   |
| WRITEM | A subroutine which is called each time a complete line of ten peaks and valleys are formed.   |

## PROGRAM SYMBOLS (READER)

|      |   |
|------|---|
| A    | The A array contains one seed of peaks and valleys  |
| I    | A control variable<br>I = (1) the seed starts with a valley<br>I = (2) the seed starts with a peak<br>An integer constant                       |
| IO   | The data set reference number<br>IO = (1) is an Air-to-Air mission<br>IO = (2) is an Air-to-Ground mission<br>IO = (3) is an Instrument mission |
| NP   | The number of data points in each seed  |
| EOF  | The end of file indicator   |
| IND  | An indicator which shows the type of couple that was made between two seeds   |
| LAS  | The last value of the new seed  |
| NML  | The next to last value of the new seed  |
| VNML | The last value of the prior seed  |

# PROGRAM SYMBOLS (TAB)

|         |  |
|---------|--|
| I       | A do loop control variable   |
| J       | A do loop control variable   |
| P       | The single peak that is entered via the call argument list                                 |
| V       | The single valley that is entered via the call argument list                               |
| IC      | An integer counter   |
| IR      | A counter which ten output values per line   |
| NP      | The number of points in a seed   |
| IV1 →   | IV9 (See input parameters)   |
| LIN     | Storage line for each print line   |
| LLL     | An integer switch  |
| TVP     | An occurrence table constraint for peak  |
| TVV     | An occurrence table constraint for valleys   |
| VGL     | No change in ground load check   |
| IND1 →  | IND9 (See input parameters)  |
| IV10 →  | IV16 (See input parameters)  |
| ISWT    | An interger switch   |
| GLØAD   | The ground load  |
| IND10 → | IND16 (See input parameters)   |
| NEXTV   | The next logical valley  |
| NP1NC   | The number of points in a seed times the frequency of points between ground loads          |
| TABLE   | The storage array for the occurrence table   |
| WRITEM  | A subroutine which is called each time a complete line of ten peaks and valleys are formed |

# PROGRAM SYMBOLS (DISPLA)

|         |  |
|---------|--|
| I       | A do loop control variable                 |
| J       | A do loop control variable                 |
| T       | The storage array for the occurrence table |
| X       | Labels for the occurrence plot ordinate    |
| Y       | Labels for the occurrence plot absicca     |
| ICC     | An integer subscript                       |
| JCC     | An integer subscript                       |
| LLL     | Dummy common value                         |
| DUM1 →  | DUM3 dummy common value                    |
| MISSION | The mission counter                        |



# PROGRAM SYMBOLS (WRITE)

|     |  |
|-----|--|
| I   | A do loop control variable                       |
| IO  | The data set reference number                    |
| IR  | The number of data values per line               |
| LIN | An array which contain ten or less output values |

# PROGRAM SYMBOLS (HILOAD)

|        |  |
|--------|--|
| I      | A counter used to limit the number of high loads added |
| P      | The peak for which the high load is substituted        |
| V      | The valley for which the high load is substituted      |
| PL     | The line value of the peak                             |
| VL     | The line value of the valley                           |
| ADDP   | The added peak array                                   |
| ADDV   | The added valley array                                 |
| GLOAD  | The ground load  |
| IASMIS | A same mission check                                   |
| LODVAL | A dummy common value not used in this subroutine       |

# PROGRAM SYMBOLS (SEV)

|       |  |
|-------|--|
| FAC   | The added severity factor                          |
| PEAK  | The peak to be altered from the AA, AG or IN array |
| PEAKL | The peak to be altered from the print array LIN    |

## PROGRAM SYMBOLS (ORDER)

|        |  |
|--------|--|
| I      | A do loop control used in search for the largest peak in each mission                            |
| J      | An array which holds the element number of the largest peak in each mission                      |
| K      | A do loop control used for printing the ordered mission  |
| M      | A do loop control used in the sorting outer loop   |
| N      | A do loop control used in the sorting inner loop   |
| P      | The peaks for a single mission   |
| V      | The valleys for a single mission   |
| IO     | The relative key used in reading the missions in an ordered manner                               |
| IR     | The line item counter  |
| IND    | The part of the world is already in order indicated switch used in the sorting technique         |
| IV1    | IV16 (See input parameters)  |
| IND1   | IND16 (See input parameters)   |
| LIN    | The print array used for printing each line of output  |
| IFLT   | The number of flights in the run   |
| GLØAD  | The ground load  |
| IPASS  | Not used   |
| LLINC  | The number of peaks and valleys in a mission   |
| VALUE  | An intermediate value used in sorting  |
| IFLTML | The total number of flights minue one, used in the sorting technique                             |
| PEAKMX | An array which stores the maximum peak of each mission to be sorted at the conclusion of the run |

## PROGRAM SYMBOLS (SORTP)

|              |  |
|--------------|--|
| I            | A do loop control variable used in the outer sorting loop                                |
| J            | A do loop control variable used in the inner sorting loop                                |
| K            | A sorting interchange temporary variable   |
| N            | An integer array of size one hundred used in the sorting technique                       |
| P            | The peaks for a single mission   |
| V            | The valleys for a single mission   |
| IR           | The line item counter  |
| IX           | Not used   |
| IND          | The part of the world is already in order indicator switch used in the sorting technique |
| IV1 → IV9    | (See input parameters)   |
| LIN          | The print array used for printing each line of input                                     |
| LM1          | The number of values in a mission minus one used by the sorting technique                |
| IND1 → IND16 | (See input parameters)   |
| IV10 → IV16  | (See input parameters)   |
| GLOAD        | The ground load  |
| LLINC        | The number of peaks and valleys in a mission   |
| IERROR       | The last value is a ground load valley indicator   |